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**Preliminary Description of a
New Late Paleocene
Land-Mammal Fauna from
South Carolina, U.S.A.**

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(Received 11 January 1984)

Abstract

Five mammalian specimens from the late Paleocene Black Mingo Group, Berkeley County, South Carolina, represent the first occurrence of Paleocene land-mammals from the east coast of North America. A P_3 or P_4 represents the taeniodont *Ectoganus gliriformis lobdelli*, known previously only from the late Paleocene of western North America. A M^1 or M^2 represents *Mingotherium holtae*, new genus and species, a taxon which may be closely related to pseudictopids, uinatheres and xenungulates. A lower premolar or molar can only be classified as "Tribosphenida incertae sedis." A ?canine and a parietal can only be identified as "Mammalia incertae sedis."

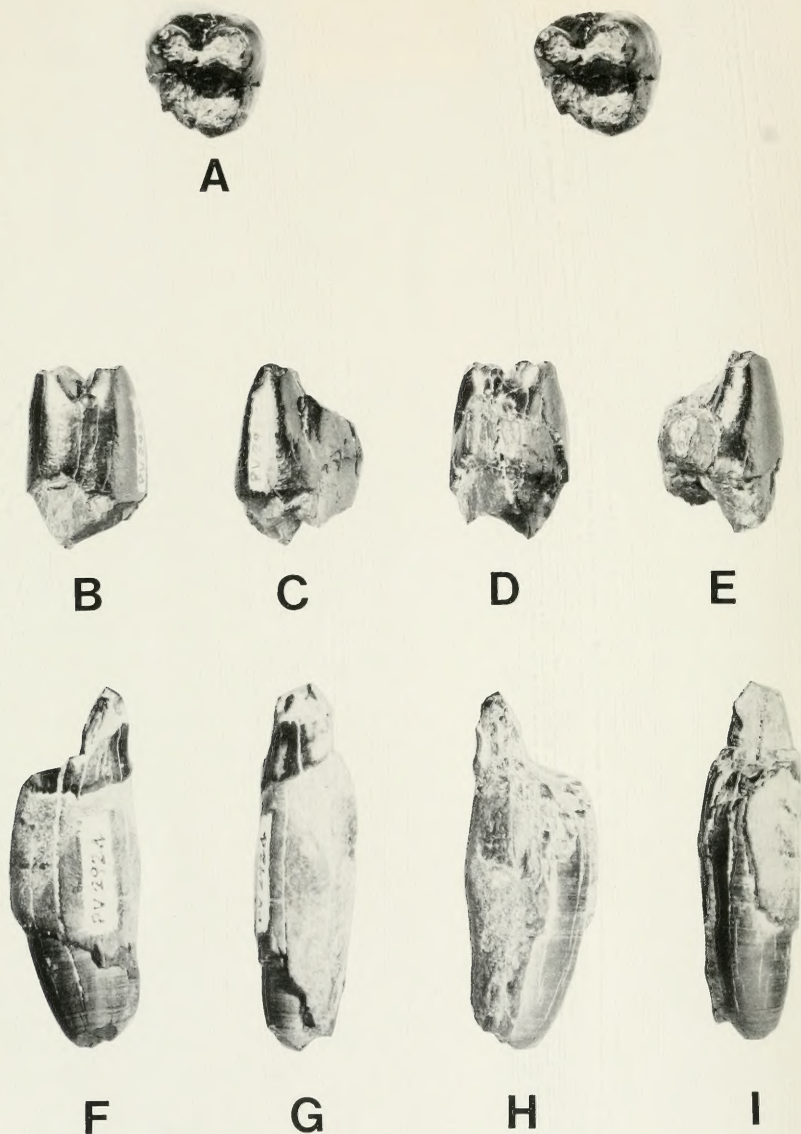
Key Words

Fossil mammal, Paleocene, South Carolina, *Ectoganus*, *Mingotherium*, *Pseudictops*, Dinocerata.

Introduction

During the excavation of a hydroelectric turbine pit along the Santee Rediversion Canal just north of St. Stephen, South Carolina, a diverse late Paleocene biota was discovered in the Black Mingo Group. The biota includes calcareous nannofossils, dinoflagellates, molluscs, sharks, rays, teleosts, turtles, squamates, crocodiles and land-mammals. This is the first known occurrence of Paleocene-early Eocene land-mammals from the east coast of North America (Schiebout 1979, Savage and Russell 1983). Schiebout (1979, p. 85) reported, but did not describe or illustrate, a single miacid tooth "from the base of the Gosport Sand [i.e., Gosport Formation] . . . at the Little Stave Creek site in Clark County, Alabama." This occurrence is probably late middle Eocene (Bartonian, chronozone 18) in age (Hazel, Edwards and Bybell, in press). *Notiotitanops mississippiensis*, described by Gazin and Sullivan (1942) from the Lisbon Formation of Clark County, Mississippi, is probably early middle Eocene (Lutetian) in age (Hazel, Edwards and Bybell, in press).

Albert E. Sanders (Curator of Natural History, Charleston Museum, Charleston, South Carolina) and Robert E. Weems (U.S. Geological Survey, Reston, Virginia) kindly entrusted me with the land-mammal material from the Black Mingo Group for description. Arrangements are currently being made for publication of all of the vertebrate groups from this locality, hopefully as separate sections in a single outlet. However, such

**Fig. 1**

Ectoganus gliriformis lobbelli, ChM PV2926 (A-E)
and Mammalia incertae sedis, ChM PV2924 (F-I). A)
stereophotograph of occlusal view of left P₃ or P₄;
B) anterior view of left P₃ or P₄; C) labial view of left
P₃ or P₄; D) posterior view of left P₃ or P₄; E) lingual
view of left P₃ or P₄; F) lateral view of caniniform; G)
posterior view of caniniform; H) medial view of
caniniform; I) anterior view of caniniform. All figures
× 1.25.

publication is at least several years away. Due to the extreme rarity and importance of the South Carolina land-mammal material, it is imperative that a brief, initial description be made available to interested workers. Therefore in this paper I illustrate and describe the South Carolina land-mammal fauna. In the aforementioned future contribution I will discuss the detailed affinities, paleobiogeographic and paleoecologic implications of this land-mammal fauna. Tooth nomenclature follows Zhou, Qiu and Li (1975).

Systematic Paleontology

CLASS Mammalia Linnaeus, 1758
SUBCLASS Theria Parker and Haswell, 1897
INFRAClass Tribosphenida McKenna, 1975
SUPERCOHORT Eutheria Gill, 1872
COHORT Epitheria McKenna, 1975
ORDER Taeniodonta Cope, 1876
FAMILY Stylinodontidae Marsh, 1875
TRIBE Ectoganini Cope, 1876 (Schoch, 1983a)
GENUS *Ectoganus* Cope, 1874
Ectoganus gliriformis Cope, 1874
Ectoganus gliriformis lodbelli (Simpson, 1929)
Schoch, 1981
(Fig. 1A-E)

Referred Specimen

ChM PV2926 (Charleston Museum,
Paleontology, Vertebrate), left P₃ or P₄.

Horizon and Locality

Collected from upper Paleocene strata belonging to the lower-upper Paleocene Black Mingo Group, Santee Rediversion Canal hydroelectric turbine pit, approximately 0.5 miles (0.8 km) north of St. Stephen, lat 33°30' N, long 80°0' W, Berkeley County, South Carolina, by Dawn Hepler, 11 April 1981. None of the specimens described here were found in situ; all came from spoil heaps resulting from the excavation of the hydroelectric turbine pit. It is probable that all of the land-mammal material originated from a sand bed

approximately 18 to 59 feet (5.4 to 17.9 m) above the base of the Black Mingo Group as exposed at this locality. This is the youngest fossiliferous horizon in the pit.

The stratum from which the land mammals probably came contains dinoflagellates in its lower part which are most comparable to the forms of the Nanafalia-Tusahoma formations of the Gulf Coast and the Paspotansa Member of the Aquia Formation in the northern Atlantic Coastal Plain. The dinoflagellates from near the top of this stratum may be age compatible with the lower assemblage, but it is entirely possible that they could represent a somewhat younger age equivalent to the Bashi and Hatchetigbee formations of the Gulf Coast and the lower member (Potapaco) of the Nanjemoy Formation in the northern Atlantic Coastal Plain (Lucy E. Edwards, written communication, 1981). This stratum yielded no diagnostic nannofossils at this site, but in the canal dug east from the turbine pit nannofossils were recovered from what appeared to be the lower part of the equivalent (but less leached) horizon. That floral assemblage probably represents NP 7 (nannoplankton zone 7) or NP 8 (Laurel Bybell, written communication, 1981). Together, these floras indicate that the lower part of the mammal-bearing stratum is late Paleocene in age (NP 7/8) and the upper part is late Paleocene (NP 9) to perhaps very early Eocene (NP 10 equivalent) in age (Curry and Odin 1982, Papp 1979: Papp places the Paleocene-Eocene boundary in the lower third of NP 12, whereas some other workers place it at the top of, or within, NP 10). This interval (NP 9-10) may correlate with supposed "earliest Eocene" (North American late Clarkforkian, early Wasatchian; European Sparnacian) land-mammal faunas of western North America and Europe (Savage and Russell 1983, p. 46; see also Curry and Odin 1982, p. 624, fig. 5). Based on correlations to marine paleoplanktonic stratigraphy the Paleocene-Eocene boundary in western North America may fall within the Wasatchian land-mammal "age," perhaps near the Graybullian-Lysitean boundary (Lucas 1984)

or possibly later in the Wasatchian (Savage and Russell 1983).

For a recent discussion of the Black Mingo Group in South Carolina, see Van Nieuwenhuise and Colquhoun (1982a, b). The late Paleocene to possibly very early Eocene age of this stratum indicates that it belongs in their Williamsburg Formation.

Description

ChM PV2926 is a left lower molariform tooth bearing a well-developed trigonid anteriorly and a well-developed talonid posteriorly. Although the base of the enamel and root are broken and lost, the tooth appears to have been moderately hypsodont and bore a single, large root below. Around the posterior and lingual sides of the talonid the enamel, which is approximately 1.0 mm thick, has been lost. Where preserved unworn, the enamel bears very fine horizontal (parallel to the tooth row) striations.

The trigonid of ChM PV2926 is wider and higher than the talonid. The maximum width of the trigonid is 14.0 mm (=maximum width of tooth); the maximum preserved width of the talonid (including 1.0 mm estimated thickness of missing enamel) is 12.5 mm. The maximum preserved length of ChM PV2926 (not including an estimate for lost enamel) is 14.4 mm.

The trigonid bears a large and high protoconid and metaconid which are equal in size and connected by a blunt, transverse crest. On the anterior face of ChM PV2926 is a small but distinct paraconid. The trigonid bears no cingulids or accessory cusps.

The talonid of ChM PV2926 bears a moderate-sized hypoconid labially and a lower entoconid lingually. These two cusps are incorporated into the smooth, posteriorly convex postcristid which forms the bulk of the talonid proper. The enclosed talonid basin is small and shallow. The hypoconid proper is appressed against the middle of the posterior face of the protoconid and the preserved apex of the hypoconid is approximately 4.0 mm lower than the preserved apex of the protoconid. The entoconid proper is

appressed against the posterolingual base of the metaconid and the apex of the entoconid is approximately 7.5 mm lower than the apex of the metaconid. The talonid bears no preserved cingulids or accessory cusps.

Discussion

ChM PV2926 is identical in size and morphology to previously described P_3 and P_4 of the taeniodont *Ectoganus gliriformis* (Schoch 1981, 1982, 1983b, in press). In M_{1-3} of *Ectoganus gliriformis* the trigonids and talonids are subequal in size, whereas in P_{3-4} the talonids are slightly smaller and lower than the trigonids as in ChM PV2926. P_3 and P_4 of *Ectoganus*, however, are virtually identical in size and morphology and it is not possible to distinguish these teeth from one another in isolation (Schoch 1983b); thus ChM PV2926 may represent a P_3 or P_4 of *Ectoganus gliriformis*. The P_3 - M_3 trigonids of *Ectoganus gliriformis lobdelli* bear small, but distinct, paraconids as in ChM PV2926. Such paraconids are either extremely minute or lacking in *Ectoganus gliriformis gliriformis* (Schoch 1983b).

Cohort Epitheria McKenna, 1975

MIORDER ?Untatheriamorpha Schoch, 1983a

ORDER Incertae sedis

FAMILY Mingotheriidae Schoch, new family

Type Genus

Mingotherium Schoch, new genus.

Included Genera

Only the type genus.

Distribution

Upper Paleocene of South Carolina.

Diagnosis

Same as that for the type genus, given below.

***Mingotherium* Schoch, new genus**

Type Species

Mingotherium holtae Schoch, new species.

Included Species

Only the type species.

Distribution

Upper Paleocene of South Carolina.

Etymology

Mingo after the Black Mingo Formation, from which the genoholotype came, and *therium* (from Greek *therion* = beast).

Diagnosis

Moderate-sized epitheres in which M^{1-2} ($=M^1$ or M^2 , i.e., anterior upper molars) bear distinct, well-separated, connate, subequal, far labially-placed paracones and metacones and large, far lingually-placed protocones; parastyles, metastyles and hypocones entirely lacking; M^{1-2} bear heavy, well-developed, subequal anterior and posterior cingula which are connected labially by poorly-developed labial cingula, but do not contact lingually; M^{1-2} each bear two moderate-sized, labially-placed roots below the paracone and metacone respectively and a single large, lingually-placed root below the protocone; M^{1-2} characterized by moderate crown hypsodonty in which enamel extends farther up the single lingual root than the labial roots.

***Mingotherium holtae* Schoch, new species**

(Fig. 2A–F)

Holotype

ChM PV4113, right M^1 or M^2 .

Horizon and Locality of the Holotype

Collected from upper Paleocene Williamsburg Formation strata of the Black Mingo Group, Santee Rediversion Canal hydroelectric turbine pit, approximately 0.5 miles (0.8 km) north of St. Stephen, lat 33°30' N, long 80°0' W, Berkeley County, South Carolina, by Doris Holt, 30 February 1982.

Hypodigm

Known only from the holotype.

Etymology

Named for the collector, Doris Holt.

Diagnosis

Same as that for the genus, given above.

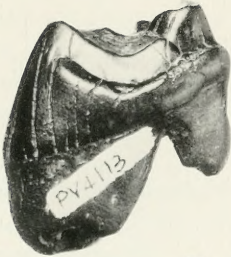
Description

ChM PV4113 is a large (maximum length = 14.8 mm; maximum width = 24.2 mm) upper molariform tooth. The well-developed tribosphenic (paracone, metacone, protocone) morphology indicates that it is a molar rather than a premolar. The nearly bilateral symmetry of the tooth (relative to a transverse plane running between the paracone and metacone and through the middle of the protocone) indicates that this tooth is an M^1 or M^2 rather than an M^3 . Based on the relatively generalized morphology of ChM PV4113, in analogy with other mammals, it is expected that the M^1 and M^2 of *Mingotherium holtae* are nearly identical in morphology. Based on the position of the presumed paracone, which is set slightly labial of the presumed metacone, ChM PV4113 is interpreted as a tooth from the right side of the upper jaw.

Labially, ChM PV4113 bears a large, anteriorly-placed paracone and a large, posteriorly-placed metacone. These cones are both conical, moderately high, well developed, distinct, subequal in size and set against the far labial edge of the tooth such that there is virtually no stylar shelf. As stated above, the



A



B



C



D



E



F



G



H



I



paracone is positioned very slightly labial of the metacone. Between the paracone and metacone is a very small, low mesostyle. ChM PV4113 bears a very low, poorly-developed labial cingulum (ectocingulum) which wraps around the anterolabial and posterolabial corners of the tooth to connect with the distinct anterior and posterior cingula respectively. This cingular border of ChM PV4113 does not form a distinct parastyle or metastyle.

Lingually, ChM PV4113 bears a large, distinct, far lingually-set protocone. The worn, but distinct, preprotocrista runs from the apex of the protocone to the anterolingual base of the paracone and the worn, but distinct, postprotocrista runs from the apex of the protocone to the posterolingual base of the metacone. These two cristae define the trigon basin. Anterolingually and posterolingually ChM PV4113 bears well-developed anterior and posterior cingula respectively. These cingula do not make contact around the lingual face of the protocone.

ChM PV4113 bears two moderate-sized roots labially, supporting the paracone and metacone respectively, and a large root lingually under the protocone. ChM PV4113 shows moderate crown hypsodonty and is characterized by enamel that extends slightly further up the protocone root lingually than the paracone and metacone roots labially. Where unworn, the enamel of ChM PV4113 is very slightly rugose.

Discussion

Mingotherium holtae is a highly distinctive taxon that is not readily referable to any known family or order. It is primitive in retaining a simple tribosphenic (trituberculate) upper molar crown morphology composed of a simple paracone and metacone labially and a simple protocone lingually (see McKenna 1975 for a discussion of character-state morphocline polarities among primitive mammals). The reduced styler shelf and far lingual positioning of the protocone are probably derived character-states in *Mingotherium*, but are of little help in determining the affinities of this genus as similar character-states of the primary cones have probably been derived independently in a number of groups (e.g., Taeniodonta, Schoch 1983b; Primates, Szalay and Delson 1979; Condylarthra and Insectivora, Matthew 1937; *Idiogenomys*, Ostrander 1983; *Pseudictops*, Sulimski 1969; Dinocerata, Flerov 1967, Wheeler 1961; Tillodontia, Gazin 1953; Mesonychidae, Szalay and Gould 1966). *Mingotherium* bears the further derived character-state of extremely well developed, nearly symmetrical anterior and posterior cingula on the upper molars. This same combination of derived features (reduced styler shelf, lingual positioning of the protocone, well-developed anterior and posterior cingula) is seen in the Mongolian late Paleocene genus *Pseudictops* Matthew, Granger and Simpson, 1929 (Sulimski 1969). *Pseudictops* is also similar to *Mingotherium* in being characterized by a moderate degree of crown hypsodonty, in lacking true hypocones and in having anterior and posterior cingula which do not meet lingual of the protocone. *Pseudictops*, however, differs significantly from *Mingotherium* in possessing well-developed paralophs and metalophs (derived) on the upper cheek teeth.

Pseudictops is an epithere (nonedentate eutherian) of uncertain affinities. Sulimski (1969, p. 107) referred the monogeneric family Pseudictopidae to "Eutheria, Order incertae sedis" and suggested that it may represent a new order of mammals. Previously, Van Valen

Fig. 2

Mingotherium holtae Schoch, new genus and species, ChM PV4113, (A-F) and Tribosphenida incertae sedis, ChM PV2927, (G-I): A) stereophotograph of occlusal view of right M¹ or M²; B) anterior view of right M¹ or M²; C) posterior view of right M¹ or M²; D) root view of right M¹ or M²; E) labial view of right M¹ or M²; F) lingual view of right M¹ or M²; G) lingual view of left lower molariform; H) labial view of left lower molariform; I) stereophotograph of occlusal view of left lower molariform. A-F $\times 1.25$. G-I $\times 2.0$.

(1964) had suggested that *Pseudictops* may be close to the ancestry of the Lagomorpha. Szalay and McKenna (1971) erected the new order Anagalida for the families Zalambdalestidae, Pseudictopidae, Anagalidae and Eurymylidae and suggested that this order may have been ancestral to the Lagomorpha. McKenna (1975) included the Pseudictopidae in the Lagomorpha, but McKenna (1982) excluded pseudictopids from the Lagomorpha. Most recently Lucas and Schoch (1982; see also Tong and Lucas 1982) have pointed out that *Pseudictops* shares many derived character-states with the orders Dinocerata (=Ungulatheres; Paleocene-Eocene of Asia and western North America: see Wheeler 1961) and Xenungulata (late Paleocene of South America: see Paula Couto 1952) and may represent the sister-taxon of Dinocerata plus Xenungulata. As noted above, *Mingotherium* shares a number of derived character-states with *Pseudictops* and thus may have been part of a late Paleocene-early Eocene dinoceratan/xenungulate/pseudictopid/*Mingotherium* (Ungulatheriamorpha) radiation in Asia and the Americas.

Tribosphenida incertae sedis

Genus and Species Indeterminate A
(Fig. 2G-I)

Referred Specimen

ChM PV2927, talonid and root of left lower molariform tooth.

Horizon and Locality

Collected from upper Paleocene Williamsburg Formation strata of the Black Mingo Group, Santee Rediversion Canal hydroelectric turbine pit, approximately 0.5 miles (0.8 km) north of St. Stephen, lat 33°30' N, long 80°0' W, Berkeley County, South Carolina, by Dawn Hepler, 30 May 1981.

Description

ChM PV2927 is a medium-sized left lower molariform tooth of which a single root and talonid are preserved. The maximum width of the talonid is 6.3 mm; the maximum preserved length of the tooth is 8.8 mm; the maximum preserved height of the root and crown is 15.0 mm and the maximum preserved height of the enamel crown measured on the labial face is 4.5 mm.

The single root of ChM PV2927 is compressed laterally (its maximum labial-lingual width is 3.9 mm), extends straight down vertically and converges to a sharp point. The tooth crown is relatively bunodont (low-crowned). Where unworn, the enamel is very slightly rugose. The enamel has been worn smooth over most of the preserved surface of the tooth.

Anteriorly, the entire trigonid was broken off postmortem and lost. However, there is no indication that a second, more anteriorly-placed root was ever present on ChM PV2927. As the single preserved root is directed straight down, rather than directed posteriorly, it is probably the sole root of ChM PV2927 and supported both the talonid and a short trigonid. The original entire length of ChM PV2927 may have been only 9 or 10 mm.

Posteriorly, ChM PV2927 bears a well-developed, but heavily worn, talonid. A distinct hypoconid is borne on the posterolabial corner of the talonid, and a slightly smaller but distinct entoconid is borne on the posterolingual corner of the tooth. These two conids are connected by a smooth (although worn), transverse postcristid. On the postcristid there may be a small hypoconulid just labial of, and closely approximated to, the entoconid. If this "hypoconulid" is real, it is badly obscured by wear. Alternatively, this apparent, faint "hypoconulid" may be merely an artifact of wear on the postcristid. A distinct cristid obliqua, which is as high as the hypoconid, runs from the apex of the hypoconid to the presumed posterolabial base of the protoconid. There is a very slight, low cingulid just labial of the cristid obliqua. An entocristid is not developed on ChM PV2927.

and the postcristid and cristid obliqua alone enclose the shallow talonid basin.

Discussion

Due to the incomplete and poorly preserved condition of ChM PV2927, very little can be concluded regarding this tooth. The placement of ChM PV2927 in the tooth row cannot even be established with certainty. The large, laterally compressed root suggests that it may be an M_3 , but the straight, transverse postcristid suggests that it may be a more anterior tooth. If ChM PV2927 originally bore only a single root, this suggests that it may be a molariform premolar.

The talonid of ChM PV2927 bears the tribosphenic configuration of cristid obliqua, hypoconid, postcristid, entoconid (Bown and Kraus 1979) and thus it pertains to either a marsupial or a placental. If the talonid really does bear a hypoconulid which is closely approximated to the entoconid (see description above), this would suggest marsupialian affinities for ChM PV2927 (Clemens 1979). If not, ChM PV2927 is so poorly known that it could conceivably pertain to almost any known eutherian order. ChM PV2927 represents an animal that was considerably smaller than *Mingotherium holtae*.

Mammalia incertae sedis

Genus and Species Indeterminate B
(Fig. 1F-I)

Referred Specimen

ChM PV2924, a caniniform tooth.

Horizon and Locality

Collected from upper Paleocene Williamsburg Formation strata of the Black Mingo Group, Santee Rediversion Canal hydroelectric turbine pit, approximately 0.5 miles (0.8 km) north of St. Stephen, lat 33°30' N, long 80°0' W, Berkeley County, South Carolina, by Vance McCollum, April 1981.

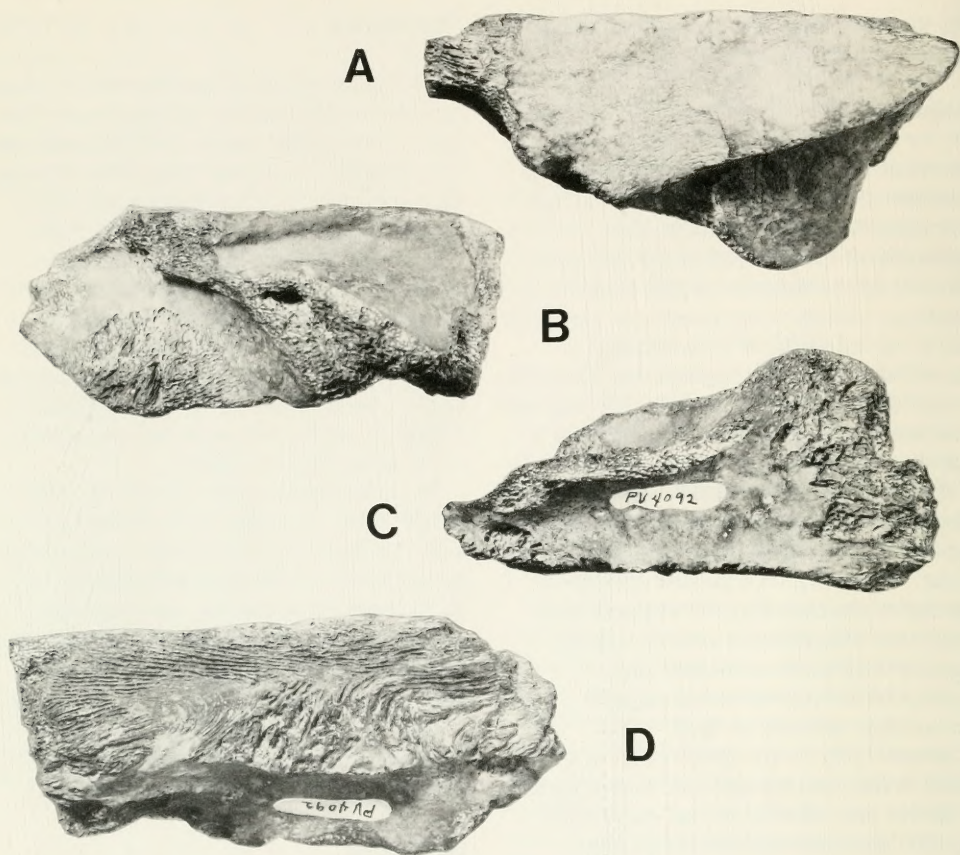
Description

ChM PV2924 is a stout caniniform tooth which is single-rooted and very slightly curved. The crown end is badly broken, but does preserve a small portion of enamel base. When holding the tooth such that the convex edge (Fig. 1I) faces away from the viewer (Fig. 1G), the base of the enamel crown extends slightly farther down the left side of the tooth than the right side. Thus, when oriented in this position, the left side is probably the lateral side of the tooth and the convex edge of the tooth is the anterior face. Accordingly, ChM PV2924 is either a left lower caniniform tooth or an upper right caniniform.

The maximum preserved length of ChM PV2924 (apex of crown to tip of root) is 39.2 mm. The maximum dimensions of the root in cross-section are 14.6 mm anteroposteriorly by 11.0 mm mediolaterally. The maximum preserved crown height is approximately 12.0 mm. The crown appears to have come to a simple point. There is a very slight cingulum/cingulid on the posterior base of the crown. The enamel is very slightly rugose where preserved in relatively unworn condition.

Discussion

ChM PV2924 probably represents a true canine, but there is also the possibility that it represents a caniniform incisor or premolar. In isolation a caniniform tooth such as ChM PV2924 is very difficult to assign to a low-level taxon; the difficulties are compounded by the damaged nature of the tooth. ChM PV2924 is a relatively large tooth and only a few groups of mammals are known from the late Paleocene and early Eocene which could accommodate a canine this size (see Savage and Russell, 1983, for faunal lists). Among the large-bodied mammals of this time are taeniodonts (Schoch 1983b), pantodonts (Simons 1960), uinatheres (Wheeler 1961) and certain large condylarths (Matthew 1937, Rose 1981). ChM PV2924 is unlike the large gliriform canines of taeniodonts, but the possibility that it represents one of the other orders cannot be excluded. Finally, it should be noted that

**Fig. 3**

Mammalia incertae sedis, ChM PV4092, (A-D). A) dorsal view of left parietal, anterior to left; B) lateral view of left parietal, anterior to left; C) ventral view of left parietal, anterior to left; D) medial view of left parietal, anterior to right. All figures $\times 0.95$.

both ChM PV2924 and ChM PV4113 represent relatively large mammals, and ChM PV2924 may be a canine of *Mingootherium holtae*.

Mammalia incertae sedis

Genus and Species Indeterminate C
(Fig. 3)

Referred Specimen

ChM PV4092, left parietal.

Horizon and Locality

Collected from upper Paleocene Williamsburg Formation strata of the Black Mingo Group, Santee Rediversion Canal hydroelectric turbine pit, approximately 0.5 miles (0.8 km) north of St. Stephen, lat $33^{\circ}30' N$, long $80^{\circ}0' W$, Berkeley County, South Carolina, by Vance McCollum, May 1981.

Description

ChM PV4092 is a thick, massive bone of the posterior skull roof which I interpret as a left

parietal. Its maximum preserved length is approximately 75.0 mm. Only one original articular surface of ChM PV4092 is preserved; all of the rest have been broken off and lost. The articular surface which remains preserves a thickened sutural area (22.0 mm thick: Fig. 3D) which I interpret as the sagittal (middorsal line) articulation of ChM PV4092 with its mate on the other side. One side or surface (Fig. 3A) of ChM PV4092 is relatively flat and roughly triangular-shaped; this surface is perpendicular to the medial articular surface and is thus interpreted as the dorsal surface of the parietal. The dorsal surface is bounded laterally by a prominent natural ridge which appears to represent part of a parasagittal crest. The parasagittal crest converges toward the midline of ChM PV4092 at one end (on the right side as viewed in Figure 3A); this convergence of the parasagittal crest toward the midline marks the posterior part of the parietal. Laterally the parasagittal crest overhangs very slightly the more posteroventral and lateral aspect of the parietal. Seen in lateral view (Fig. 3B), the anterolateral aspect of the parietal forms a semicircle and is slightly concave; this area may have formed part of the posterior orbital region. The posterolateral aspect of the parietal is smoothly convex and formed part of the outer skull roof surface. Seen in ventral view (Fig. 3C) the parietal is slightly concave and appears to be pierced by several small foramina.

Discussion

ChM PV4092 conforms in morphology to a mammalian left parietal. It does not appear to pertain to a reptile (specifically a crocodilian) or other lower vertebrate as it lacks any surface sculpturing. By late Paleocene-early Eocene standards, ChM PV4092 pertains to a relatively large mammal, and the animal it

belonged to had a set of moderately-developed parasagittal crests. These features suggest that ChM PV4092 may represent a uinathere (Wheeler 1961) or a pantodont (Simons 1960). The possibility also exists that ChM PV4092 may pertain to *Mingotherium holtae*.

Summary

Only two of the five specimens which compose the Black Mingo local land-mammal fauna (here named) are diagnostic of a taxonomic category at the species level. ChM PV2926 records a considerable geographic range extension of the late Paleocene taeniodont *Ectoganus gliriformis lodbelli*; previously this taxon was known only from Colorado, Montana and Wyoming (Schoch 1983b). ChM PV4113 represents a distinctive new taxon, *Mingotherium holtae*, which may have affinities with the Mongolian *Pseudictops*, with the uinathere of western North America and Asia, and with the South American xenungulates. ChM PV2927 can only be classified as "Tribosphenida incertae sedis." ChM PV2924 and ChM PV4092 can only be classified as "Mammalia incertae sedis" at the present time, although there is the distinct possibility that they may pertain to *Mingotherium holtae*.

Acknowledgments

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Literature Cited

- Bown, T. M. and M. J. Kraus.** 1979. Origin of the tribosphenic molar and metatherian and eutherian dental formulae. In *Mesozoic Mammals: The First Two-thirds of Mammalian History*, ed. by J. A. Lillegraven, Z. Kielan-Jaworowska and W. A. Clemens, p. 172–81. Univ. California Press, Berkeley.
- Clemens, W. A.** 1979. Marsupialia. In *Mesozoic Mammals: The First Two-thirds of Mammalian History*, ed. by J. A. Lillegraven, Z. Kielan-Jaworowska and W. A. Clemens, p. 192–200. Univ. California Press, Berkeley.
- Cope, E. D.** 1874. Notes on the Eocene and Pliocene lacustrine formations of New Mexico, including descriptions of certain new species of vertebrates. *Ann. Rept. Chief of Engineers, Washington, D.C.* (43rd Cong., 2nd sess., 1874, H. Exec. Doc. 1, Pt. 2, Vol. 2, Pt. 2), p. 591–606.
- 1876. On the Taeniodonta, a new group of Eocene Mammalia. *Proc. Acad. Nat. Sci., Philadelphia* 28:39.
- Curry, D. and G. S. Odin.** 1982. Dating of the Paleogene. In *Numerical Dating in Stratigraphy*, Pt. I, ed. by G. S. Odin, p. 606–630. John Wiley and Sons, Chichester, England.
- Flerov, K. K.** 1967. Dinocerata of Mongolia. Israel Program for Scientific Translations, Jerusalem. 84 p.
- Gazin, C. L.** 1953. The Tillodontia: an early Tertiary order of mammals. *Smithson. Misc. Collect.* 121:1–110.
- Gazin, C. L. and J. M. Sullivan.** 1942. A new titanotherium from the Eocene of Mississippi, with notes on the correlation between the marine Eocene of the Gulf coastal plain and continental Eocene of the Rocky Mountain region. *Smithson. Misc. Collect.* 101:1–13.
- Gill, T.** 1872. Arrangement of the families of mammals with analytical tables. *Smithson. Misc. Collect.* 11: 1–98.
- Hazel, J. E., L. E. Edwards and L. M. Bybell.** In press. Significant unconformities and the hiatuses represented by them in the Paleogene of the Atlantic and Gulf Coastal Province. *Am. Assoc. Petrol. Geol. Mem.*
- Linnaeus, C.** 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera, species cum characteribus, differentiis, synonymis, locis. Editio decima, reformata.* Stockholm, Laurentii Salvii. 824 p.
- Lucas, S. G.** 1984. Systematics, biostratigraphy and evolution of early Cenozoic *Coryphodon* (Mammalia, Pantodontia). Ph.D. diss., Yale Univ., 648 p.
- Lucas, S. G. and R. M. Schoch.** 1982. The distribution and phylogenetic relationships of the Dinocerata (Mammalia, Eutheria). *Geol. Soc. Am., Abstr. Programs* 14:551.
- Marsh, O. C.** 1875. New order of Eocene mammals. *Am. J. Sci., Ser. 3*, 9:221.
- Matthew, W. D.** 1937. Paleocene faunas of the San Juan Basin, New Mexico. *Trans. Am. Philos. Soc.*, n.s. 30:1–510.
- Matthew, W. D., W. Granger and G. G. Simpson.** 1929. Additions to the fauna of the Gashato Formation of Mongolia. *Am. Mus. Novit.* 376:1–12.
- McKenna, M. C.** 1975. Toward a phylogenetic classification of the Mammalia. In *Phylogeny of the Primates*, ed. by W. P. Luckett and F. S. Szalay, p. 21–46. Plenum Press, New York.
- 1982. Lagomorph interrelationships. *Géobios Mém. Spéc.* 6:213–23.
- Ostrander, G. E.** 1983. New early Oligocene (Chadronian) mammals from the Raben Ranch local fauna, northwest Nebraska. *J. Paleontol.* 57:128–39.
- Papp, A.** 1979. Tertiary. In *Treatise on Invertebrate Paleontology*, ed. by R. A. Robison and C. Teichert, Pt. A, p. A488–A504. *Geol. Soc. Am., Boulder, Colo.*
- Parker, T. J. and W. A. Haswell.** 1897. *A Text-book of Zoology.* MacMillan and Co., London, Vol. 2, 683 p.
- Paula Couto, C. de.** 1952. Fossil mammals from the beginning of the Cenozoic in Brazil. Condylarthra, Litopterna, Xenungulata, and Astrapotheria. *Bull. Am. Mus. Nat. Hist.* 99:355–94.
- Rose, K. D.** 1981. The Clarkforkian land-mammal age and mammalian faunal composition across the Paleocene–Eocene boundary. *Univ. Mich., Pap. Paleontol.* 26:1–197.
- Savage, D. E. and D. E. Russell.** 1983. *Mammalian Paleofaunas of the World.* Addison-Wesley Publ. Co., Reading, Mass. 432 p.
- Schiebout, J. A.** 1979. An overview of the terrestrial early Tertiary of southern North America—fossil sites and paleopedology. *Tulane Stud. Geol. Paleontol.* 15:75–93.

- Schoch, R. M.** 1981. Taxonomy and biostratigraphy of the early Tertiary Taeniodonta (Mammalia: Eutheria). *Geol. Soc. Am. Bull.* 92:933-41.
- 1982. Phylogeny, classification and paleobiology of the Taeniodonta (Mammalia: Eutheria). *Proc. Third N. Am. Paleontol. Conv.* 2:465-70.
- 1983a. Third North American Palaeontological Convention. *Geosci. Can.* 10:204-07.
- 1983b. Systematics, functional morphology and macroevolution of the extinct mammalian order Taeniodonta. Ph.D. diss., Yale Univ., 713 p. Available from University Microfilms International, Ann Arbor, Mich. (Dissertation number 8329313).
- In press. Systematics, functional morphology and macroevolution of the extinct mammalian order Taeniodonta. *Bull. Peabody Mus. Nat. Hist. (Yale Univ.)*.
- Simons, E. L.** 1960. The Paleocene Pantodonta. *Trans. Am. Philos. Soc.*, n.s. 50:3-99.
- Simpson, G. G.** 1929. Third contribution to the Fort Union fauna at Bear Creek, Montana. *Am. Mus. Novit.* 345:1-12.
- Sulimski, A.** 1969. Paleocene genus *Pseudictops* Matthew, Granger & Simpson 1929 (Mammalia) and its revision. *Palaeontol. Polonica* 19:101-29 (dated 1968, issued 1969).
- Szalay, F. S. and E. Delson.** 1979. *Evolutionary History of the Primates*. Academic Press, New York. 580 p.
- Szalay, F. S. and S. J. Gould.** 1966. Asiatic Mesonychidae (Mammalia, Condylarthra). *Bull. Am. Mus. Nat. Hist.* 132:127-74.
- Szalay, F. S. and M. C. McKenna.** 1971. Beginning of the age of mammals in Asia: the late Paleocene Gashato fauna, Mongolia. *Bull. Am. Mus. Nat. Hist.* 144:269-318.
- Tong, Y. and S. G. Lucas.** 1982. A review of Chinese uinatheres and the origin of the Dinocerata (Mammalia, Eutheria). *Proc. Third N. Am. Paleontol. Conv.* 2:551-56.
- Van Nieuwenhuise, D. S. and D. J. Colquhoun.** 1982a. Contact relationships of the Black Mingo and Pee Dee Formations—the Cretaceous-Tertiary boundary in South Carolina, U.S.A. *South Carolina Geol.* 26: 1-14.
- 1982b. The Paleocene-lower Eocene Black Mingo Group of the east central coastal plain of South Carolina. *South Carolina Geol.* 26:47-67.
- Van Valen, L. M.** 1964. A possible origin for rabbits. *Evolution* 18:484-91.
- Wheeler, W. H.** 1961. Revision of the uinatheres. *Bull. Peabody Mus. Nat. Hist. (Yale Univ.)* 14:1-93.
- Zhou, M., Z. Qiu and C. Li.** 1975. On the terminology of molar structures in primitive eutherians and suggestions for unified Chinese translated terms. *Vert. Palasiatica* 13:257-66.

Erratum for Postilla 191

In Postilla 191 [J. D. Archibald, R. M. Schoch and J. K. Rigby, Jr. 1983. A new subfamily, Conacodontinae, and a new species, *Conacodon kohlbergi*, of the Peripitychidae (Condylarthra, Mammalia). 24 p.] it was incorrectly reported that a joint Yale-U.S. Bureau of Land Management study of the stratigraphic position of lower Paleocene mammal-bearing localities in the San Juan Basin, New Mexico, was undertaken during the summer of 1981. This study actually took place during the summer of 1980 and the holotype of *C. kohlbergi* was collected by R. M. Schoch on 21 June 1980.

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